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(56) Documents Cited

**GB 1125142 A**

**GB 1002324 A**

**GB 0857335 A**

**WO 97/06005 A**

**US 4517242 A**

**US 4053666 A**

**US 3900672 A**

(58) Field of Search

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INT CL<sup>6</sup> **B05D 5/00 , B32B 17/10 , C03C 17/32 , C09D**

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(54) Abstract Title

**Protecting glass against staining**

(57) To reduce iridescent staining on glass sheet when made there is applied a coating of a polymer having acid groups, preferably in solution including a wetting agent and a defoaming agent. The polymer may be a polymer or copolymer of acrylic or methacrylic acid or a sulphonic acid functional derivative of polyolefin or polystyrene. The coating can be washed off.

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### GLASS COATING

The invention relates to the protection of glass and in particular of sheet glass. More particularly the invention relates to the protection of glass surfaces in storage and transport. Typically such sheets will be flat glass or float glass.

It has been noted that so-called stains can form on glass surfaces especially when the glass is newly made. Such staining manifests itself as an iridescence. The problem is particularly noticeable when glass sheets are stacked or laid one next to another. The glass sheets can have their major surfaces in adjacent face-to-face relationship, irrespective of whether those major faces are disposed horizontally or vertically or in an intermediate inclined position. The tendency to stain is seen in hot humid conditions. Staining is thus a particular problem in climates where such conditions are common, but it can also be a significant problem in more temperate climates.

It is an object of the invention to reduce or avoid the risk of such staining.

According to the invention in one aspect there is provided a method of protecting a glass surface against staining, the method comprising forming on the surface of the glass a coating of a polymer having acid groups in a sufficient concentration to reduce staining.

Preferably the rate of application is from about 50 to about 500 mg of acid groups per square meter of glass surface.

Preferred polymers are polymers of acrylic acid or methacrylic acid. Sulphonic acid functional derivatives of polyolefins and polystyrene, may also be suitable. The polymers may be homopolymers and heteropolymers. Specific co-monomers are acrolein, simple or branched alkyl or hydroxyesters of acrylic acid or methacrylic acid; vinyl derivatives of benzene or toluene; vinyl esters of organic acids (e.g. vinyl acetate, vinyl butyrate and vinyl propionate).

The polymer may have a molecular weight between preferred upper and lower limits. Below a molecular weight of around a few hundred there is little or no film-forming. The molecular weight can be as high as several million. Above a molecular weight of above about 600,000 the polymer chains may be sufficiently sterically hindered in solution as to lose their effective carboxyl or other concentration. In the downstream handling of the "glass stack" the composition needs to be washed off and this too has an effect on the molecular weight range; as the molecular weight increases then the ease of re-solubilising decreases. The preferred polymers are polymers of acrylic acid or methacrylic acid having molecular weights in the range of about 10,000 to about 600,000 and solution viscosities (in water or organic solvent) of about 12 to about 100 centipoises, at 5% polymer concentration, measured at 25°C.

While the coating may be applied in any suitable way typically surfactants will be present in order to achieve wetting of the glass sheets. Defoamers or anti-foamers may

also be present to suppress the tendency to foam which also tends to hinder the formation of a coating of polymer on the glass surface. Dyes may be present. Other ingredients may be present so long as they do not reduce the effect of the acid groups in the applied coating.

The invention includes a glass sheet having on a surface thereof a coating of a polymer having acid groups in sufficient concentration to reduce staining.

In order that the invention may be well understood it will now be described by way of illustration only with reference to the following example.

#### **EXAMPLE**

A formulation comprising 100g of an aqueous solution of polyacrylic acid (concentration : 25% by weight, molecular weight approximately 20000), 1.0 gm of silicone oil emulsion (defoamer), 0.3 gm non-ionic surfactant and 0.1 gm cochineal (dye), water 2400 gm, was sprayed on to a glass sheet to form a continuous functional film which remains easily removable with water. The film reduced the risk of iridescent staining.

**CLAIMS**

1. A method of protecting a glass surface against staining, the method comprising forming on the surface of the glass a coating of a polymer having acid groups in sufficient concentration to reduce staining.
2. A method according to Claim 1, in which the rate of application is from about 50 to about 500 mg of acid groups per square meter of glass surface.
3. A method according to Claim 1 or 2, wherein the polymer comprises polymers or copolymers of acrylic acid or methacrylic acid or sulphonic acid functional derivatives of polyolefins and polystyrene.
4. A method according to Claim 3, wherein the copolymers are simple or branched alkyl or hydroxyesters of acrylic acid or methacrylic acid; vinyl derivatives of benzene or toluene; or vinyl esters of organic acids.
5. A method according to any preceding Claim, wherein the polymers are polymers of acrylic acid or methacrylic acid having molecular weights in the range of about 10,000 to about 600,000.
6. A method according to Claim 5, wherein the polymer is applied in solution having a solution viscosity (in water, or organic solvent) of about 12 to about 100 centipoises, at 5% polymer concentration, measured at 25°C.

7. A glass sheet having on a surface thereof a coating of a polymer having acid groups in sufficient concentration to reduce staining.



Application No: GB 9911344.1  
Claims searched: 1-7

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## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B2E (EKB)

Int Cl (Ed.6): B05D 5/00; B32B 17/10; C03C 17/32; C09D 5/00 123/32 133/02

Other: -

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1125142 A (S.C.JOHNSON), see page 1 line 21 - page 17 line 16 and page 32 line 1 - page 33 line 38.	1,3,4,7
X	GB 1002324 A (PENNSALT CHEMICALS), see page 17 line 8 - page 18 line 3	1,7
X	GB 0857335 A (MINNESOTA MINING), see page 2 lines 14-45	1,7
X	WO 97/06005 A (BASF), whole document	1,3,4,7
X	US 4517242 A (SINHA), whole document	1,7
X	US 4053666 A (TAYLOR), whole document	1,3,7
X	US 3900672 A (HAMMOND), whole document	1,3,5,7

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.

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